Chapter Five
Trails

Trails are located throughout both the Carmel Mountain and Del Mar Mesa Preserves and adjacent areas. Under this management plan, a multi-use trail system will be established for both Preserves allowing for a variety of recreational uses while protecting sensitive biological areas. Many of these sensitive areas are currently located within the existing trails on the Preserves and have the potential to be adversely impacted by foot traffic, equestrian, and mountain biking activity. The trail system will have connectivity to other open space areas and parks via existing trails, created trails, and surface streets.

Potential future closures of trails in biologically sensitive areas will help concentrate human activity in less biologically sensitive areas and reduce the number of access points to the Preserves. Trails depicted on privately owned land in this plan will not be implemented until the land is conserved or written permission is obtained from the landowner(s).

A. Carmel Mountain Preserve

1. Existing Trails

Existing trails throughout the Carmel Mountain open space are made up of narrow footpaths, SDG&E easement access roads and wide trails used by vehicles and horseback riders. Figures 5-1, 5-1a and 5-1b show the present trail composition on the Preserve. Private lands present on the Preserve have also been denoted. Trails range in width from a few feet to approximately 15 feet and the width can be highly variable on any one trail. The trails tend to widen into larger open areas at trail intersections. Many of these intersections are characterized by few or no shrubs and are mostly dominated by bare ground, non-native grasses or carpets of *Selaginella* growth. In some areas where trails intersect there are volunteer trails and shortcut trails that impact surrounding vegetation. Vernal pool depressions are found along and within the roadways in many locations.

Existing access to the Preserve area consists of SDG&E easement roads and single-track trails. SDG&E access points are located at the northwest corner of the Preserve within the Pinnacle at Carmel Creek apartment complex at the end of Carmel Creek Road and at the southern edge at the intersection of Longshore Way and Shorepoint Way. Single-track trail access points are located in various areas along the edges the housing developments surrounding the Preserve.

2. Proposed Trails and Recommendations

Figures 5-1c and 5-1d show the trail system proposed by the City of San Diego to be the preferred trail system of the Preserve. Colored areas delineate the trail system on the map. Trail areas not part of the proposed trail system are recommended for closure, as funding and biological information becomes available. For example, the eastern trails avoid an area of existing trails that support a

large population of short-leaved dudleya and several vernal pool depressions. Should funding become available, the existing dirt road and trails in this area are recommended for closure.

Future closure of unauthorized trails in the Preserve is recommended to eliminate excessive trail use, the proliferation of non-native species, and restrict access to the Preserve to designated entry points. Additional areas of restoration and enhancement on Carmel Mountain are discussed in detail in Chapter 8.

3. Proposed Access and View Points

There are three proposed designated access points to the Carmel Mountain Preserve. One access point is via the SDG&E easement road along Shoreview Way and two are located along the northern edge the City Park currently under construction in the southern portion of the Preserve. It is anticipated that a parking lot will be provided in the future park design and a majority of park uses will enter the preserve through the future park site. Two scenic viewpoints are also proposed in the southwestern corner of the Preserve where the landscape slopes downwards toward a panoramic view of Torrey Pines, Del Mar, and the Pacific Ocean (see Figure 5-1d).

4. Potential Access for Private Landowners

Potential access for private property owners on Carmel Mountain can be provided through a gate on the western side of the future park site located south of the preserve. Potential access road has been included on Figure 5-1. The future design of the park shall ensure that legal access to private property owners on Carmel Mountain is not prevented. A key to the gate will be provided to private property owners when development is proposed. Additional environmental review will be required for access and development of private lands on Carmel Mountain.

B. Del Mar Mesa Preserve

1. Existing Trails

A large network of trails is located throughout the Del Mesa Preserve open

space area and are made up mainly of SDG&E easement access roads as well as wide trails used by vehicles and horseback riders and narrow footpaths or single-track trails. Figures 5-2 and 5-2a-d show the present trail composition on the Preserve. Trail widths vary from a few feet to 30 feet where easement road width has been expanded.

The majority of the roads on-site are maintained by SDG&E for access to their transmission line towers. The southeasternmost road accesses the Vernal Pool Reserve on CDFG property and ends at the southeastern corner of the site. Many of the roads and trails bisect vernal pool habitat within the chaparral. Vernal pools are located alongside and in some cases within the roads in the Preserve. Deep depressions and road ruts have been made by vehicles in these areas during the wet seasons. Many of the smaller footpath trails are also used by mountain bikers and horseback riders in addition to the wider, easement roads. Holes have been illegally cut in several places along the CDFG Vernal Pool Reserve fence line to facilitate access for mountain bikers and hikers.

2. Proposed Trails and Recommendations

Figures 5-2e-h show the trail system proposed by the City of San Diego to be the official trail system of the Preserve. Colored areas delineate the trail system and vernal pool areas on the map. Trail areas not part of the proposed trail system are recommended for closure, as funding becomes available. Much of Del Mar Mesa Preserve is within private inholdings of land. The City will purchase land from willing sellers and additional trail closures in those areas could occur at that time.

The proposed trail system makes use of the existing SDG&E access roads on-site. The trail system begins in the several locations in southwestern corner of the site and continues north along the SDG&E access roads. No trails in the eastern half of the Preserve within the CDFG Vernal Pool Reserve are in the proposed trail system.

A large portion of the existing access roads and proposed trail bisect vernal pool habitat (see Figures 5-2e-h). RECON has mapped 88 vernal pools and depressions within the SDG&E access roads and approximately 40 pools in the road through the CDFG Vernal Pool Reserve (see Chapter 8 for individual vernal pool locations). In several locations, roadside vernal pools have been impacted by road maintenance.

The southeastern corner of the Del Mar Mesa Preserve has trails that traverses the fenced off vernal pool reserve. In several areas along the fence line, holes have been cut to gain access and volunteer trails have been created leading to the main trail. Routine law enforcement patrols monitoring the fence line protecting the vernal pool reserve, routine fence and barrier maintenance, and formally closing the southeastern trail within the reserve will reduce impacts to the area by discouraging off-trail use within it and would be consistent with the goals of the reserve.

All remaining trails not within the proposed trail system are recommended for future formal closure for the protection of Tier I southern maritime chaparral habitat, an extensive vernal pool complex, and an existing vernal pool reserve, to restrict access to the Preserve to designated access points and to reduce the proliferation of trails and invasive species.

The access road that leads to the entrance of the pool reserve ranges from 20 to 30 feet in width at several points. It is recommended that this area be revegetated along its margins to narrow the width of the road. Chapter 8 discusses a weeding and enhancement program for various areas within the public lands on the Preserve that would commence once funding is available.

3. Proposed Access and View Points

Three designated access points are proposed for the Del Mar Mesa Preserve. Each access point is located at an existing entrance to the

Preserve. The westernmost access is at the end of Shawridge Road via the new housing development. The northern access point is located where the SDG&E access road exits the Preserve at its northern boundary. The southern access point is via the Los Peñasquitos Open Space Preserve at the end of Park Village Road. These proposed access points will also serve as access for City vehicles and private landowners. Other entry points to the Preserve are located on SDG&E trails to the east of Park Village Road that lead directly from Los Peñasquitos onto Del Mar Mesa.

There are four scenic view points (see Figure 5-2) proposed on Del Mar Mesa Preserve. Two viewpoints are located west off the main trail that runs northward. These trails terminate on the mesa tops. The other two viewpoints are at the southwest corner, which lead to Los Peñasquitos Open Space Preserve.

4. Potential Access for Private Landowners

Access to private property on Del Mar Mesa can be obtained through existing SDG&E access roads. A potential access road has been included on Figure 5-2. Additional environmental review will be required for access and development of private lands on Del Mar Mesa.

C. Neighboring Trail Systems

The trail locations have been evaluated in relation to the off-site open space trail systems to maintain connectivity. Specifically, access to Los Peñasquitos Canyon and Torrey Pines State Reserve and other county-wide trail systems from the Preserves. Carmel Mountain and the Del Mar Mesa open space Preserve trail systems will have connectivity to Los Peñasquitos Open Space Preserve and Torrey Pines State Reserve via surface streets and existing trails. The latter two Preserves are part of the "Spines to Pines" Trans-County Trail system (Figure 5-3).

1. Los Peñasquitos

The Los Peñasquitos Canyon Preserve is located between I-5 and I-15 and is composed of two large coastal canyons south of Del Mar Mesa and the Park Village Road neighborhood. Los Peñasquitos and its

tributary, Lopez Canyon, both part of the Trans-County trail system, cover approximately 4,000 acres and have a network of trails that are used by hikers, horseback riders, and mountain bikers. The Preserve is home to a number of sensitive plant and animal species and serves as a movement corridor for mule deer, bobcats, and the occasional mountain lion.

2. Trans-County Trail

The Trans-County Trail is a 114-mile route which stretches from Torrey Pines to the Anza Borrego desert. The trail corridor extends through several administrative jurisdictions and consists of existing and proposed trails on public lands and within the public right-of-way (see Figure 5-3). Nearly 70 percent of the route exists on federal, state, county and city lands. Some trail construction is still needed to provide connectivity in the City of Poway and between Sycamore Canyon Open Space and Oak Oasis Open Space. In 1998, the expedition known as the "Spines to Pines" expedition traversed the route from the desert to the coast (SDNHM 2001).

The Carmel Mountain and Del Mar Mesa Preserves have connectivity to Torrey Pines State Park and Los Peñasquitos Canyon Preserve, via existing trails, public roads, and public right-of-ways. Torrey Pines can be accessed from the Carmel Mountain Preserve via Carmel Mountain Road and the closed portion of Sorrento Valley Road. A perimeter trail along the lagoon links Sorrento Valley Road to the Torrey Pines State Reserve North Beach parking area. If the trail system proposed by the Carmel Mountain Conservancy (CMC) for the closed portion of Sorrento Valley Road is adopted and completed, then connectivity between the Carmel Mountain and Del Mar Preserves would be possible (CMC 2001). Los Peñasquitos Canyon has direct connectivity to the Del Mar Mesa Preserve to the east of Park Village Road neighborhood located between the two Preserves. There are also several access points between the housing developments along Park Village Road.

D. Trail Uses

A variety of uses will be allowed throughout the trail systems on the Carmel Mountain and Del Mar Mesa Open Space Preserves. Recreational activities will include hiking, equestrian, and mountain biking on the multi-use trail system. When trails encounter sensitive resources, fencing will provide protection and prevention of degradation to these areas (Chapter 8 provides further details). Recreation on the Preserves are primarily passive activities, such as jogging, hiking, bicycling, horseback riding, nature appreciation, and wildlife watching. When domestic animals are brought on the Preserves, they will be constrained at all times (leashed) and cleaned after by owner. Encouraging multi-use activities on designated trails is important to maintain the biological integrity of the habitat surrounding them. Trails in natural areas can significantly alter the habitat surrounding them. The opening of canopies by vegetation removal, soil compaction, and the modification of existing drainage patterns by removal of upper soil horizons result in the modification of micro-topography which directly influences micro-climate and are direct consequences of trail construction (Cole as cited in Dehring and Mazotti 1997). In addition, off-trail use adjacent to marked trails results in increased instances of vegetation trampling and development of unauthorized volunteer trails. Vegetation trampling causes structural damage to plants, which can lead to modified species composition and reduced cover and height. Trampling also affects trailside vegetation by changing soil conditions through compaction and disruption of surface horizons. These changes in soil conditions often result in decreased nutrient, oxygen, and moisture levels and resistance to root penetration (Dehring and Mazotti 1997). Volunteer or short-cut trails that link two main trails opens up a wider area of habitat to disturbance, increases fragmentation within the landscape and causes a deterioration of natural vegetation

communities by creating favorable conditions for exotic species.

1. Hiking

The Carmel Mountain and Del Mar Mesa Preserves are both in the vicinity of housing developments. Once the surrounding development projects are completed, Carmel Mountain will be surrounded by residential housing on three sides. The southern boundary of Del Mar Mesa Preserve links with the Los Peñasquitos Open Space Preserve and will attract hikers coming from that Preserve. Both Preserve sites are currently used by individuals for hiking and pet walking purposes.

2. Equestrian

In the interest of balancing the preservation of sensitive biological resources and maintain equestrian use within the Preserve area, sensitive resources should be fenced, and the trails modified to allow the co-existence of sensitive resources and equestrian use (see Chapter 8). Sections 1.5.8 of the MSCP requires that the placement of equestrian use areas for both the Del Mar Mesa and Carmel Mountain Preserves minimize equestrian contact with wetland areas and other highly sensitive biological areas (City of San Diego 1997). Equestrian use on trails can contribute to the deterioration of soil conditions by loosening the soil, trampling of vegetation and can encourage avoidance behavior in native animals (Dehring and Mazotti 1997). By remaining on established trails, in this case, the SDG&E access roads, the related horseback riding impacts will be minimized in the surrounding habitat.

3. Mountain Biking

As stated above, those sensitive resources located near high impact activity, such as mountain biking, should be fenced. Protecting the resources and redirecting the trail around them will allow the co-existence of both resources and recreation.

Mountain bikers do more damage to a trail than a person walking does as the weight of the rider and bike is concentrated on two relatively small surfaces (amounting to about six square inches). A hiker's weight is distributed on two fairly large surfaces (the bottom of his shoes, measurement varies with shoe size). The smaller the area of contact, the more pressure is put on the ground. Mountain bikes put approximately five times more pressure on the trail than a hiker does. A single mountain bike puts pressure on about 2.6 times more land than a hiker would. The pressure can disrupt the soil surface, causing erosion, and increase the down cutting of existing erosion rills. Mountain bikers can also cause trails to be widened, by going off the trail when they avoid rocks and other obstacles, or pass walkers, and by forcing walkers off the trail to wait for them to pass.

With the great amount of pressure that is applied by mountain bikes it is easy for the homes of burrowing animals, and sometimes the animals themselves, to be crushed, and since bikes move faster than walkers, some animals may be crushed before they can move out of harm's way. The U.S. Geological Survey (USGS) has documented numerous instances of animals killed and maimed by bikes in MSCP open space areas throughout the county and advocate mountain biking restrictions in sensitive natural areas (USGS and the Department of Biology, San Diego State University 2001).

"Rooting" occurs when the bike tires press the dirt around a tree root down, but not the root itself. The tree root becomes exposed and can cause other trail users to lose their footing. When too many roots are exposed people will go off the trail to avoid them. Mountain bikes also compact the soil, killing fine roots, and making it harder for plants to grow.

A lot of "walking traffic" (people, horses, etc.) have been forced off the trail due to unsafe biking conditions. Horses can be spooked by oncoming cyclists, and throw their riders to the ground and riders can be injured by the fall. Trails often are not made for seeing great distances, so the bikes seem to appear out of nowhere, spooking anyone unlucky enough to be caught in the path of a speeding cyclist.

Giving the cyclists a wide enough path, signage to slow down in sensitive areas and maintaining the trails (such as relocating rocks) will reduce the risk of riders veering off the trails to avoid hikers or to pass slower moving cyclists.

4. Potential Access for Private Landowners

Access to private property on Del Mar Mesa can be obtained through existing SDG&E access roads. A potential access road has been included on Figure 5-2. Additional environmental review will be required for access and development of private lands on Del Mar Mesa.

E. Trail Implementation Guidelines

Please refer to Appendix 6 for MSCP Trail Implementation Guidelines.

F. Trail Maintenance

The following guidelines have been taken from California State Parks and Recreation. This information is intended to serve trail maintenance crews. There are a number of variables that contribute to trail construction and maintenance, making this an inexact science. The location of the trail, soil type, climate, and applied usage to the trails all contribute to its unique needs. There are general guidelines, however, when adhered to that can greatly reduce or prevent trail degradation and minimize maintenance expenses.

1. Trail Problems

There are general characteristics that designate a poorly maintained or constructed trail. The following issues describe those conditions:

- **Deep Trenching**. This is described as a trail that has sunken, causing hikers to feel as though they are walking in the bottom of a half pipe. This causes equestrians to drag their spurs.
- **Widening.** The trail has become widened from a single or double track to an unattractive wilderness "freeway" of several parallel tracks, each trenched to varying degree.
- **Short Cuts.** Trail users travel the shortest distance between two points (a straight line), disregarding the designated paths of travel. This creates a web of trails, which are typically steep and erosive.
- **Tripping Hazards.** Tree roots, rocks, and other natural objects are exposed from normal recreational use and erosion.
- **Steepness.** When a trail exceeds a comfortable level of steepness over a long distance, users will either discontinue using the trail or they will not enjoy their excursion.
- **Impact to Natural/Cultural Resources.** Sensitive plant/animal species and archaeological sites are impacted by erosive trails. Multiple trails exacerbate such impacts.

2. Causes of Trail Problems

One or more of the following causes may contribute to the degradation of a trail:

- **Water.** This is the foremost cause of trail degradation. The movement of water exposes tripping hazards and causes erosion and deep trenching to occur.
- **Poor Initial Trail Design .** This is difficult to overcome, even by regular maintenance.
- **Inadequate or Inappropriate Maintenance.** This wastes valuable crew time and may contribute to trail problems.

3. Designing for Trail Maintenance

The original trail design and its alignments are the most integral component of trail maintenance. A well-designed trail will be easier to maintain, will deteriorate less rapidly, and will provide a more pleasant

recreational experience. On the other hand, a poorly designed trail is difficult to maintain, deteriorates quickly and, once you lose it, there is not much that can be done to restore it. In addition, a poorly designed trail will always be less pleasant to hike or ride.

4. Gradient

Generally, the linear gradient of a trail should be less than 10 percent. The term "gradient" refers to the ratio of the rise over the run. In other words, an elevation gain of 2 feet in 20 horizontal feet represents a 10 percent gradient.

Ten percent is a good standard, but circumstance may warrant a greater or lesser gradient.

In highly erosive, sandy soils, a 5 percent slope may be excessive. Granitic soils are more forgiving and can allow long sections of trail to be constructed at 13 to 15 percent. It is best to look at existing trail conditions and measure gradients to determine what maximum gradient works best in each unique condition. However, it should be noted that trails less than 10 percent are far more comfortable to hike and ride. The soils may allow for a trail that exceeds 10 percent, but the users might not.

5. Relationship to Existing Contours

In map jargon, a contour is a line of points that are at the same elevation. If you walk precisely parallel to a contour, you are walking at a level (0 percent) grade. If you walk perpendicular to a contour, you are walking either straight uphill or straight downhill. A well-designed trail is laid out to traverse a hillside, closer to parallel than perpendicular to the contours.

When a trail runs perpendicular to the contours, water runs down the middle of the trail, causing trenching, even at a 10 percent gradient. The only way to get water off the trail is for the route to **traverse** the natural slope, because then there is always a lower side of the trail. When there is a lower side of the trail, it becomes a simple matter to redirect water across and off the trail, rather than allowing it to cut a channel down the trail's centerline.

6. Outslope

A well-designed trail should be constructed to have a 3 to 4 percent cross-slope to get the water off the trail as soon as possible. This explains why it is difficult to construct an effective trail in a flat meadow. You cannot merely cut out sod and call it a finished trail. It will always be easiest to construct an outsloped trail if the original trail alignment traverses the natural slope.

7. Avoid Switchbacks

A "switchback" is any place where the alignment of a trail traverses a slope in one direction and then abruptly "switches back" toward the opposite direction. Switchbacks are often used to run a trail up a steep slope in a constrained location. Although switchbacks are often the only solution to the problems of rock outcrops and steep slopes, they should be avoided where possible. Unless they are perfectly designed and constructed, switchbacks present an irresistible temptation to shortcut the trail and cause erosion over a web of indiscriminately created volunteer routes.

8. Key Elements of Trail Maintenance

Inspection of the trail is the first step in trail maintenance. When erosion problems are evident, water may be the cause, and where to divert it is an important issue. The following elements represent the primary mechanisms to be used in the maintenance of trails. They are generally listed in priority order, but each has its own special application and purpose. Maintaining the outslope, install and maintain water bars, and maintaining drainage dips represent the most important issues to address.

9. Maintaining the Outslope

This is the first order of business in trail maintenance. It is the simplest, but most labor intensive trail maintenance tool.

Normal trail use will build up a berm along the outside (downhill) edge of the trail. If allowed to continue, the berm will grow and prevent water from flowing off the trail, causing gullying down the centerline of the trail. If this centerline gullying is allowed to continue unchecked, the trail will trench deeper and deeper until it is both unusable and unredeemable.

The outslope is maintained by simply pulling the berm back into the trail tread. This must be done consistently by trail crews. In many cases, if the outslope is restored on a regular basis, little or no maintenance is needed of any other kind. However, some use patterns (extensive equestrian use), soil conditions (sandy), and climate conditions (high precipitation) combine to minimize the effectiveness of this maintenance tool; it just has to be done too often to make it worthwhile.

Once a trail has reached a predicament where the berm is too large and overgrown with vegetation to be removed; the outslope cannot be restored and other maintenance approaches must be employed. When a trail deteriorates to an unrecoverable state, the trail is a lost cause, and the best solution is trail abandonment and relocation.

10. Install and Maintain Water Bars

Water bars divert water off a trail at controlled points along the trail. They can be incorporated in the original construction of a trail, or they can be installed later as a maintenance measure. Done well, a series of water bars can effectively eliminate erosion and stabilize a trail for years. Done poorly, water bars can accentuate trail erosion and become dangerous tripping hazards.

The most permanent water bars are made from native rock obtained on-site. When rock of a suitable size is not available, water bars can be made from 4x6-foot redwood timber, or native logs. Peeler logs or other landscaping products should not be used because their appearance is foreign to a natural environment. Bicyclists prefer a new product made of black rubber that diverts water, but is flexible enough to allow cyclists to easily cross. However, this too, may be inappropriate for a natural environment.

There are many options about the proper installation of water bars. Three trail handbooks will promote three different approaches. The following is another approach. The elements of a properly installed water bar are:

- Set the water bar at a 60-egree angle across the trail. A water bar set perpendicular (90 degrees) across the trail will not divert the water off. A water bar set 30 degrees across the trail can be awkward to hike or ride over.
- Extend the water bar such that water is carried completely off the trail to a steep side slope. Otherwise, the water flow will bypass the water bar and erosion will occur.
- Provide rock at the downslope end of the water bar to dissipate the energy of the flowing water, thereby minimizing erosion.
- The top of the water bar should be nearly flush with the trail tread to minimize tripping hazards. On first consideration, it may not make sense to make the top of the bar flush with the tread because there would be nothing to "catch" and divert the water. However, we are not concerned about diverting all water flowing down a trail, only that amount of water than causes erosion. With the bar flush, its effectiveness only kicks in when there is enough water to erode away a lip on the uphill side of the water bar, which then allows the bar to divert the water flow.
- The boulders used for rock water bars must be huge; otherwise, they will be kicked out of place by a horse. The rocks should overlap like shingles on a roof to prevent water from flowing between rocks and eroding away the integrity of the water bar. In addition, long boulders with one flat side work best to prevent tripping hazards.

Water bars need regular maintenance. The excess soil and debris that build up at the downslope end of the water bar needs to be periodically graded out to assure that water flows off the trail. Without regular unplugging, a water bar is useless.

11. Maintaining Drainage Dips

A drainage dip is built into the original trail alignment and is a change in gradient (a "dip" in the trail) that dissipates and diverts water flow (its like a built-in water bar). Like a water bar, it only remains an effective means of erosion prevention as long as regular maintenance keeps it unplugged.

12. Pruning

Pruning vegetation is an essential and regular part of trail maintenance, especially in brushy chaparral areas. Multi-use trails should have 10-foot vertical and 8-foot horizontal clearance (exceptions are made for protecting a tree or working around a large boulder). There may be specific considerations for trail dimensions depending on the location of the trail, to comply with the proper jurisdictions of the region.

Too often, trail pruning is accomplished in the most expeditious manner possible—a branch intrudes within the walking/riding space of the trail and is quickly lopped-off so that it does not intrude and the debris is indiscriminately tossed aside. However, our goal in trail maintenance is to maintain a trail in as natural appearance as possible. A quick pruning job deals only with the function of trail maintenance, not the aesthetics.

There are six elements of acceptable pruning in the State Park System. Each of these elements makes pruning a more tedious maintenance task, but results with a trail that is compatible with the natural environment.

- **Do not toss debris**: Branches that are randomly discarded usually end up hanging in adjacent shrubs or trees. These dead branches are both unsightly and create a fire hazard.
- **Place debris out of view.** This element requires the extra effort of dragging branches under and around shrubs.
- **Place the butt (cut) end away from the trail.** This will help disguise the debris.
- **Each cut branch should be touching the ground to promote decomposition.** This means that brush piles are not appropriate.
- **Pruning should be done sensitively so that the trail appears natural** and not as if a chain saw just blasted through. Trail users should not be aware that **any** maintenance work has recently been done.
- **Prune to the collar of any branch stem** for the health of the shrub and a more natural looking result. At the base of any branch there is a wide section that contains a plant's natural healing agents. Any pruning performed away from this collar will expose the plant to a greater risk of infection. A cut at the collar will naturally heal. For large branches over two inches in diameter, cut from the bottom, then cut down from the top. This prevents tearing of the bark, reducing infection.

13. Signing/Mapping

Adequate signing and mapping keeps trail users on the trail. Uncertainty about which trail to use may lead to new trails being created by trail users. These new trails will become maintenance problems and will ultimately need to be abolished.

14. Check Dams

Check dams are a popular, though generally ineffective, instrument of trail maintenance. A wood timber is placed 90 degrees across a trail. In theory, the check dam is intended to slow the velocity of water flowing down the trail, thereby reducing erosion. In reality, nearly all check dams only halt erosion in the two to three feet immediately behind the check dam, but accelerate erosion immediately below and beside the dam. This is because they never take the water off the trail; they only slow it down momentarily. For check dams to be truly useful in

stopping erosion, they need to be spaced three feet apart, and this effectively makes a stairway out of the trail.
Check dams should not be used in trail maintenance. However, they may have limited application in restoring abandoned trail alignments to natural conditions.

15. Import Fill Material

A deeply trenched trail can be restored by importing dirt or decomposed granite, compacting it, and recreating a well-drained outsloped trail. However, in most situations, this approach is usually both cost prohibitive and far too labor intensive.

G. Trail Rerouting

Trail rerouting is beyond the responsibilities of a trail maintenance crew. New trail alignments must be flagged by experienced park staff and then reviewed by resource specialists for compliance with the California Environmental Quality Act. Trail maintenance crews can provide valuable assistance by alerting park staff to those trail routes that may need to be rerouted.
There are three measurements that dictate that a trail relocation is needed:

- When the maintenance crew is dealing with a poorly designed trail that has deteriorated to the extent that remedial measures will not work or will constantly need repair or replacement, AND
- A significantly better route is available.
- To avoid sensitive habitat/species.

The telltale signs of a trail that needs to be relocated are deep trenching and a gradient exceeding 20 percent over about 100 feet of trail.

H. Trail Monitoring

Trail monitoring is extremely important in evaluating environmental impacts resulting from a variety of uses on the trails. Some activities will impact the integrity of the trails more so than others, and will need to be actively monitored more closely. It is therefore beneficial to track when activities occur more frequently than others (there may be seasonal differences).

The following guidelines may contribute to keeping track of how many people are actively using the trails, and for what kinds of recreation.

- Identify the impacts being monitored, including impacts to water quality, soils, wildlife, flora, and other users (accidents, injuries, enjoyment of the trail).
- Establish quantitative and qualitative measurement scales for impacts.
- Establish impact thresholds which, if reached, trigger correction or closure of the trail to bicycles, equestrian, or other high impact activity.
- Establish a schedule for monitoring activities.
- Establish a written reporting system.
- Train personnel to follow the monitoring program.
- Reliable trained persons from user groups may be used to supplement monitoring by staff.
- Specify baseline inventories to allow for monitoring of trends.
- Secure the resources to carry out the monitoring plan.

The best enforcement of regulations will come from regular patrolling combined with effective education and an active monitoring program.
Trail monitoring provides organizations and individuals a sense of what is occurring in the backcountry and a method to document degradation and damage to public lands. Trails receive impact from hikers, horses, and motorized vehicles. Motorized recreation often causes the most overall damage to the backcountry.